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| 09/782,072      | 02/12/2001  | Huei-Tarn Liou       | 11993/I             | 9795             |

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| EXAMINER |
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| ART UNIT | PAPER NUMBER |
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1762

DATE MAILED: 07/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/782,072

Applicant(s)

LIYOU ET AL.

Examiner

Michael Cleveland

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

1. Claim 9 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 4, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wainright (U.S. Patent 5,052,382, hereafter '382) in view of Fefferman (U.S. Patent 3,653,946, hereafter '946), Fitch (U.S. Patent 2,984,575, hereafter '575), Leinkram et al. (U.S. 3,607,379, hereafter '379), and Kurschner et al. (U.S. Patent 5,795,841, hereafter '841).

'382 teaches a gold-coated silica tube for use as an electrode in an ozone generator (col. 3, lines 11-53), but does not teach a method of making the electrode. Therefore, one of ordinary skill in the art would have been motivated to have looked to the related art for methods of forming gold on ceramics such as silica.

Claims 1 and 4: '946 teaches a method of gilding a ceramic substrate, such as alumina (col. 4, lines 33-35), which comprises:

- preparing a coating material which contains gold (col. 2, lines 58-75);
- cleansing the substrate (col. 3, lines 13-16), which may be alumina (col. 4, lines 33-35);
- brushing (i.e., smearing) the prepared coating material on the substrate to form a film thereon (col. 3, lines 18-22);
- drying the substrate after brushing on the coating material (col. 3, lines 22-24);

Art Unit: 1762

baking the substrate at a temperature of 427-1054 °C to form a gold film (col. 3, lines 30-col. 4, line 15);

and cooling the substrate to room temperature (col. 3, lines 69-75).

'946 does not explicitly teach A) a tubular substrate, B) drying the cleaned substrate, C) inspection of the substrate to see if the film is free of defects, D) the particularly claimed baking time and temperature, and E) retrieval of the tube after the temperature in the stove is below 110 °C.

A) '946 does not teach that the substrate is tubular. However, '575 teaches that decorative gold coatings may be provided for tubular ceramic substrates. See, for example, col. 12, lines 5-21, which demonstrate tubular substrates including a tumbler, a bottle, and a tube. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the method of '946 on a tubular ceramic substrate to have provided a decorative coating for the substrate because '946 teaches a method of applying adherent gold coatings on ceramic substrates and '575 teaches that decorative gold coatings are desired on tubular ceramic substrates.

B) '946 does not explicitly teach drying the cleaned substrate. However, the examiner takes Official Notice that it is well known to dry substrates between cleaning and coating steps. For example, Leinkram et al. (U.S. 3,607,379), col. 1, line 73-col. 2, line 15, is cited as demonstrating drying a substrate between steps of cleaning and applying a metal. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have dried the substrate after cleaning it because such is a conventional step in the deposition of metals onto cleaned ceramic substrates.

C) '946 does not explicitly teach inspection of the substrate to see if the film is uniform and free of defects. However, it is extremely well known to inspect a completed product to determine if it is satisfactory. For instance, '575 teaches that after the gold films are formed, they are observed, and the quality of the film is judged (col. 12, lines 1-22). In addition, '946 teaches that defects, such as bubbles and blisters, are undesirable. Taking the references as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have inspected the films to judge the quality (i.e., uniformity) and to have evaluated

Art Unit: 1762

whether such defects existed in order to have determined if the products would have been suitable.

D) '946 does not specifically teach baking at 780-880 °C. However, the disclosed baking range (427-1054 °C, discussed above) overlaps the claimed range. The baking times of '946 are less than the claimed times. However, '946 discloses that an adherent gold coating is desired (Title) and indicates that further baking may strengthen the bond of gold to the substrate (col. 4, lines 3-15). However, '841 teaches that the adhesion of metals, such as gold (col. 1, lines 10-19 and col. 2, lines 1-4), to ceramic substrates, such as alumina or quartz (col. 1, lines 50-65) may be improved by heating at 200-1000 °C for 0.5 to 24 hours. The heat treatment temperatures and times overlap the claimed ranges. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a temperature and time form within the claimed ranges because '841 discloses that they are operative for increasing the adhesion of metals to ceramics. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

E) '946 does not explicitly state that the substrate is removed from the stove after the temperature has been reduced to room temperature. However, it does teach that the cooling of the substrate should be controlled in order to reduce stress (col. 3, lines 69-72). The Examples indicate that this may be done by leaving the substrate in the furnace (i.e., stove) until a certain temperature is reached (col. 4, lines 46-51; col. 5, lines 1-12). The substrate may be removed at approximately 200 °C. The teaching at col. 5, lines 10-12 demonstrates that the substrate may also be left in the oven until it reaches room temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the method of '946, '575, '379, and '841 as the particular method of forming the electrode of '382 with a reasonable expectation of success because '946, '575, '379, and '841 teach operative methods of depositing gold on ceramics.

4. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wainright '382 in view of Fefferman '946, Fitch '575, Leinkram '379, and Kurschner '841, as described

Art Unit: 1762

above regarding claim 1, and further in view of Chow et al. (U.S. Patent 5,759,230, hereafter '230).

'382, '946, '575, '575, and '841 are discussed above, but teach the use of gold resins rather than gold chloride as a precursor for the gold film. However, '230 teaches that metal films may be made from metal precursor solutions including those of metal chlorides (col. 1, lines 6-8; col. 2, line 57-col. 3, line 10). Gold (III) chloride ( $\text{AuCl}_3$ ) is specifically disclosed as an operative precursor in Table I. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used gold (III) chloride as the gold precursor in place of the gold resins of '946 with the expectation of similar results because '230 teaches that it is also able to be decomposed to form a gold film.

The references do not explicitly teach that the concentration of the precursor is 10-11%. However, '841 suggests a precursor concentration of 0.01-2% (col. 2, lines 46-48), '575 appears to teach the use of about 10 weight % of the gold precursor (Examples IX and X), '946 teaches the use of about 20% of the gold precursor (col. 4, lines 22-62), and '230 teaches the use of about 0.3-6 % of the gold precursor (Table I; the examiner assumed that the solution density was approximately that of the solvent, ethylene glycol: 9.31 lb./gal.). Taken collectively, the references suggest precursor concentrations of 0.01-20%. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 3: '946 and '575 do not explicitly state that the substrate is kept at room temperature for 30 minutes after the coating material is smeared on. However, ozone generators require maintenance, and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed such maintenance at room temperature. The time of the maintenance would be an engineering decision balancing the amount of maintenance performed and the amount of time off-line. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the maintenance time, including a value of about 30 minutes, in order to provide the optimum balance of proper maintenance of the generator and functioning time.

Art Unit: 1762

Claim 4: 12 hours is within the time range disclosed by '841, as discussed above.

Claim 5: '946 does not explicitly teach removing the substrate at less than 100 °C and cooling it at room temperature. However, the examples teach removing the substrate at about 200 °C (col. 4, lines 46-50; col. 5, lines 4-6) or room temperature (col. 5, lines 10-12), thereby teaching an effective range of room temperature to 200 °C. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range (just above room temperature to 100 °C) disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

### ***Response to Arguments***

5. Applicant's arguments filed 11/14/2003 have been fully considered but they are not persuasive.

Applicant argues that the amendment to claim 1 clarifies that the product is an ozone generator electrode. The argument is convincing, but Applicant does not explain why claim 9 further limits claim 1.

Applicant's arguments regarding the criticality of the temperature ranges are unconvincing because they are not commensurate in scope with the claims. Applicant points to passages that state that the coating adheres well at the high temperature, high electric current, and high voltage of the claims, but there is no indication that coatings prepared with other baking times and temperatures do not so adhere. The argument is also unconvincing because the claims do not require an active step of using the product as an electrode in an ozone generator at high temperature, high electric current, and high voltage.

Applicant's second affidavit is acknowledged. However, it is unconvincing because it is not commensurate in scope with the claims. It asserts that the temperature range of 780-880 °C is critical, but does not present results at 780 nor 880 °C. The only value within the range is 800 °C. Also, the process of the affidavit is not commensurate in scope with the claims, which are not limited to the use of 10-11% concentration of gold (III) chloride in solution that is diluted with a sulfur-containing volatile oil, and it is unclear whether all the tubes were baked for times

Art Unit: 1762

between 10 and 14 hours or if each was baked for the same specific time. If the latter is the case, the specific time must be identified.

Applicant argues that the phrase “after reaching 1200 °F, the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours).” does not suggest retrieving the tube after the temperature in the stove is below 110 °C and putting the tube under room temperature.” The Examiner disagrees. The substrate must be under room temperature (which is below 110 °C) if it cools to that final value, and the entire passage from lines 4-12 indicates that the substrate is not disturbed during cooling. The passage at col. 5, lines 4-6 indicates that the process of “cool[ing] slowly through normal radiation... to 400 °F” occurs in the furnace. Therefore, the teaching at lines 10-12 of “slowly cool[ing] through normal radiation... to room temperature” reasonably appears to occur entirely in the furnace. (Applicant has traversed the examiner’s conclusion of the previous two sentences, but the traversal is unconvincing because Applicant has not pointed out the specific language of the cited passage which indicates that the tube is removed before room temperature is reached. No traversal under this grounds can be convincing without such an indication and a clear explanation of why one of ordinary skill in the art would have made that interpretation. In fact, Applicant admits at p. 7, lines 19-21 of the response that the passage does teach that the gold-coated substrate on ‘946 is retrieved below 110 °F.) Further, the references makes no indication that the exterior of the furnace is kept at a temperature other than room temperature, and therefore retrieving the substrate would also necessarily be putting it under room temperature. The examiner notes that Applicant has not provided any alternate interpretation of the passage that does not meet Applicant’s claim limitation.

Applicant argues that the tube of col. 5, lines 10-12 is a gold coated substrate, not a dried quartz or aluminum oxide containing tube, is heated and retrieved after the temperature of the stove is below 110 °F. The tube of ‘946 has been cleaned (col. 3, lines 13-16) and dried (col. 3, lines 22-24). Therefore, it is a cleaned and dried tube. The claim does not exclude that the tube may also be gold-coated. In fact, Applicant’s process of converting the precursor to a gold coating is what occurs in the claimed stove (see spec., p. 5, lines 10-22).

Applicant argues that claim 1 does not refer to heating of an already gold-coated substrate and retrieval of it. The argument is unconvincing because the claim does not exclude that the

Art Unit: 1762

retrieval step may occur after a later firing step. Even if the claim were so amended, the argument would be unconvincing because '946 teaches that room temperature is an suitable temperature for removing gold-coated tubes from ovens, and the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Applicant challenges the examiner's assertion that the "substrate is not disturbed during cooling". The argument is unconvincing because Applicant admits at p. 7, lines 19-21 of the response that the teachings of col. 5, lines 10-12 teaching retrieving the tube at room temperature. Furthermore, the assertion is based on comparison of the language at col. 5, lines 4-6, which indicates that the process of "cool[ing] slowly through normal radiation... to 400 °F" occurs in the furnace. Therefore, the teaching at lines 10-12 of "slowly cool[ing] through normal radiation... to room temperature" reasonably appears to occur entirely in the furnace.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

Art Unit: 1762

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (571) 272-1418. The examiner can normally be reached on Tuesday-Friday and alternate Mon, 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read 'Michael Cleveland', is positioned above the printed name.

Michael Cleveland  
Patent Examiner  
July 21, 2004